

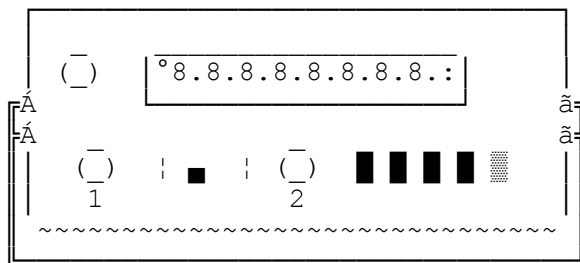
Marconi Counter Type 2432A

By G8MNY

(Updated Nov 20)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

I have repaired one of these old Marconi Instruments 560MHz Precision Frequency Counters, Model No.52432-313Z.

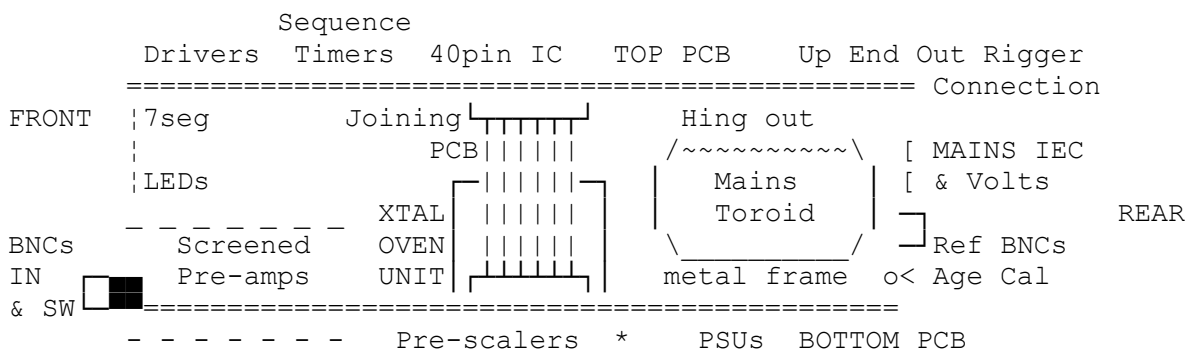


>1 50MHz-560MHz, 50mV-5V max, 50Ω BNC
Burst Mode, holds reading on sig loss
>2 10Hz-200MHz 25mV-5V (250V 50Hz) 1MΩ BNC
AF filter, <200kHz
LF Multiplier, 0.01Hz Res to 13kHz (1Sec)
Gate times 10S, 1S, 10mS, 1mS
Resolution 0.1Hz, 1Hz, 10Hz, 100Hz ±1 count
Oven Ref Output & Ext 1MHz 1V BNCs
Supply 110/120/220/240V AC IEC.

I could not find a diagram for this "A" version, board layout & circuit are not the same as the 2432 model, the 3 power supplies are all different. But the counter & ICs are all the same, so a good starting point.

FAULT

"Not working", there was no -12V, caused by a shorted tantalum capacitor, & that had taken out the T05 pass transistor. The +12V +5V rails were both dangerously high, due to no negative rail on their control 741 op-amps! A simple fault, if none of the chips were fried with the over voltage, it should work now? But life is never that simple, as that was not the only fault! The 1S gate range read 10x too low & other ranges occasionally read 0.6x low.

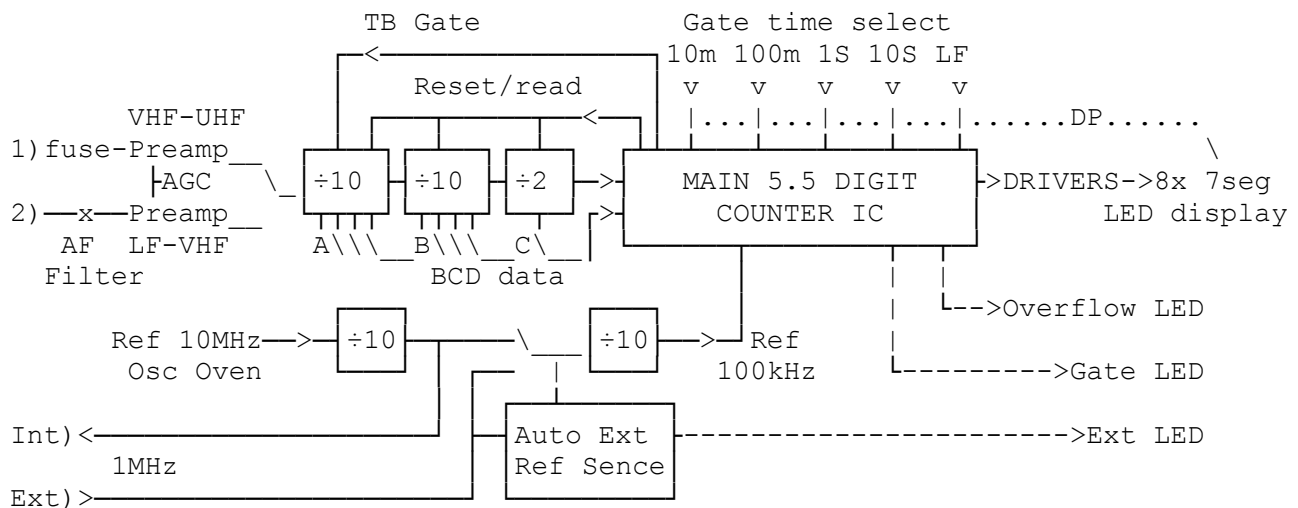


Pressing hard on the top PCB did change the faults, but a good solder up over the 2 PCBs, did nothing! All these faults eventually proved to the large main special counter IC, with it's 40 gold plated pins & socket on the top PCB. Re-seating it MANY TIMES initially cleared all the faults, so no blown chips, from the original PSU fault. But it did not stay OK for long so I looked inside the IC holder to see several broken socket fingers! So I soldered the IC directly in. (well you would never get a replacement IC)

A year later another fault appeared, the Ovened 10MHz Ref Osc stopped working! An aged rubber sleeve (conducting) around the Trimmer C was the fault, after much poking around.

HOW IT WORKS

The 2 inputs both see pre-amps with a common AGC (90dB LF, 54dB UHF) & are relay selected, to feed a special gated UHF ÷10 pre-scaler IC, then into an HF ÷10 pre-scaler, & last into a ÷2. The resultant ÷200 feeds the slower special 40 pin main 5.5 digit counter IC. The pre-scalers also feed 9 BCD data lines, read during gate reset time, for the additional (LSD) 2.5 digit information to make up the 8 digit read out.



The main IC determines the TimeBase gate time & is feed with 100kHz reference. This is derived from a fairly accurate & stable 10MHz Xtal osc & buffer in the electronically controlled oven.

The fast reading LF multiplier range (a useful LF feature) gives resolution down to 0.01Hz in 1 second! It counts reference clock for a few input cycles (100kHz Ref & Gate swapped) & then the reciprical is calculated & displayed. But it only works up to 13kHz!

TESTING & CALIBRATION

The +5V rail has a preset for setting it to +5.10V & the +12V rail follows. The -12V is independant.

Input 1 VHF-UHF, pre-amp tends to oscillate @ 400MHz with no input, & a lockout preset (like a squelch) kills the erroneous reading. When adjusted well, it managed >810MHz @ 1V input (5V max=250mW).

Input 2 AF-VHF, pre-amp has a Schmitt trigger, & setting the bias preset (DC1) well, is very important for best sensitivity, & good to VHF. It managed >320MHz @ 1V input.

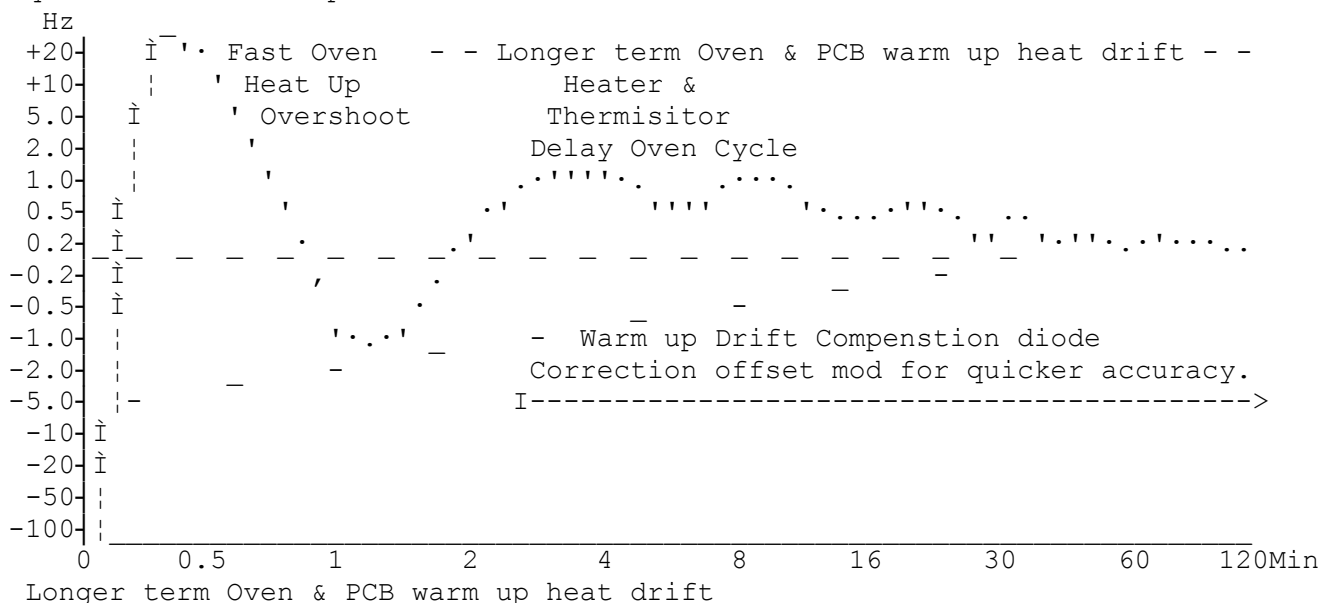
Both pre-amps share the same AGC preset with 6V DC set testpoint (no signal).

Reference oscillator calibration is done after at least 15 min warm up with the rear multi-turn preset. Compare the 1MHz output with an off air locked 1MHz on dual beam scope (while counting something), or just count a reference source.

Overflow LED lights over 99999999 count, but the display is still accurate for >8 digits.

OVEN STABILITY

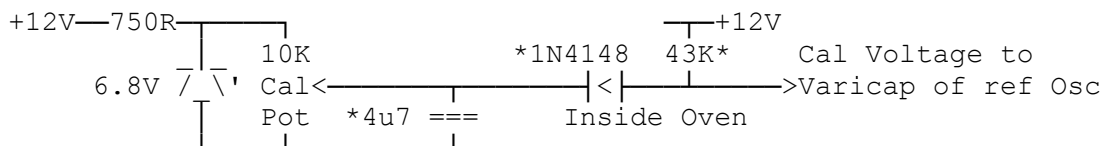
Square law Time-Hz plot of a 10MHz off air locked reference.



In use it gives repeatable accuracy of $< 2/10^7 \pm 1$, or less than $\pm 2\text{Hz}$ in 10MHz after 1 min warm up! But 1 hr for 20x better stable reading of $< 1/10^8 \pm 1$, or less than $\pm 0.1\text{Hz}$ in 10MHz! (ref to an off air source)

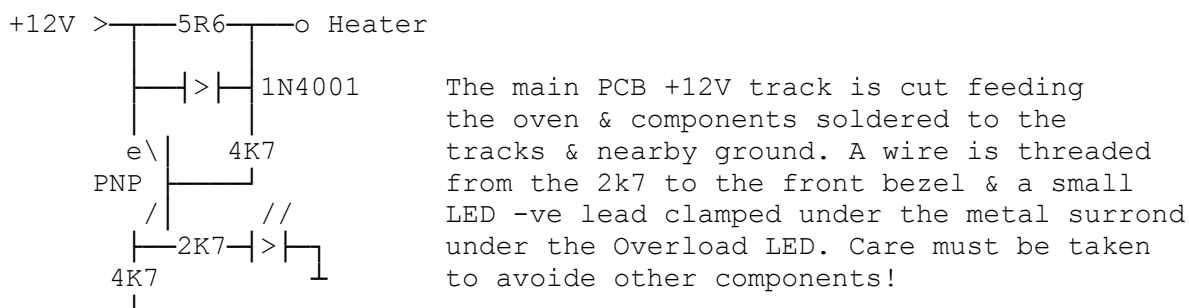
The internal reference is 10-100x more stable/accurate than a non-ovened Xtal in a cheaper counter, or for that matter your rig !

MODIFICATION. To reduce the warm up drift of above in a few mins.



Put *4u7 near oven connections to reduce stray Counter input pickup affecting the reference. Take plastic cover off oven & put *diode & 43K under the foam insulation.

OVEN LED MOD. This shows when Oven is warming up.



See my other tech buls "Watson 'Hunter' Counter Mods", "PIC Freq Counter Mods", "Old Venner Counter Type TSA3334", "198kHz Off Air Standard", "Off Air Lock for Ref Osc", "Calibrating Frequency" & "RTT Comms Test Set".

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP